

Silicon Photonic Crystals Templated on Polymer Opals

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Artificial silica opals have shown their capabilities in the photonic crystals field in the last ten years. Self-assembly by vertical sedimentation is now the most used method of fabrication for these structures because it allows for growing thin opals with precise control over thickness and low level of undesired defects.

Polymer spheres have demonstrated their superior quality in terms of monodispersity and ease of manipulation as compared with silica. Usually the optical quality of the resulting opals is far better. Besides, polymer spheres can be synthesized in a much larger range of sizes and their density allows sedimentation regardless of size. However, the thermal stability of these polymer opals is much lower (around 100-200 °C) which limits their use as templates restricting the number of materials and compatible growth methods.

Here we will show that it is possible to template silicon inverted structures on polymer opals by means of Chemical Vapour Deposition at usual reaction temperatures (from 300 to 400 °C) preserving the high optical quality of the primitive polymer opals.